SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Audit of Vegetation Management Program

Audit #99-13

Prepared By
Office of Inspector General

Allen Vann, Inspector General
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SOUTH FLORIDA WATER MANAGEMENT DISTRICT

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Re: Final Report – Audit of the Vegetation Management Program # 99-13

This audit was performed pursuant to the Inspector General's authority set forth in Chapter 20.055, F.S. The audit focused on evaluating herbicide inventory controls, project manager monitoring efforts of exotic species eradication contracts and overall vegetation management program administration. This report was prepared by Dan Sooker.

Sincerely,

Allen Vann
Inspector General

AV/ds
Enclosure

c: Frank Finch
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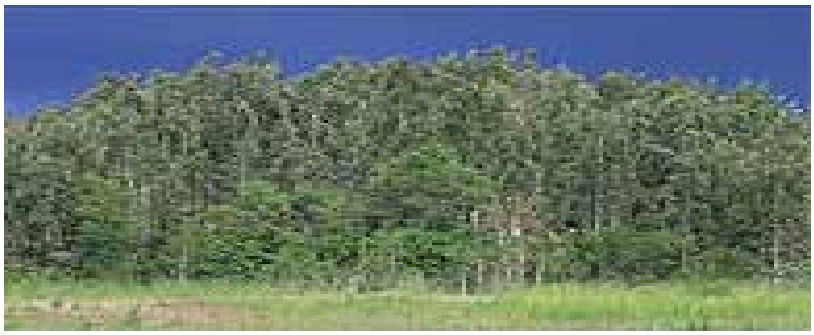
Introduction

The District's Vegetation Management Division (the Division) is tasked with controlling exotic vegetation in approximately 1,800 miles of canals and levees, 500,000 surface water acres and 850,000 acres in the Everglades Water Conservation areas. The Division also manages exotic vegetation on District properties. Vegetation management activities primarily benefit the District-wide water resource management and regional restoration programs.

When the project works were turned over to the District's predecessor organization, the Central and Southern Florida Flood Control District, the District inherited an obligation to maintain the project works at peak efficiency. This obligation included aquatic weed control in canals and nuisance vegetation along canal levees.

Invasive plants are non-indigenous vegetation that have no natural enemies, such as insects, and can often out-compete native vegetation because of the lack of growth restraints. There are 120 invasive plant species of which 62 are considered category 1 species[1]. Category 1 species are defined as most invasive and disruptive. Examples of category 1 species are melaleuca, Brazilian pepper, water hyacinth, and hydrilla. Invasive plants grow rapidly and displace native vegetation resulting in decreased biological diversity.



Melaleuca Strand

It is estimated that melaleuca and Brazilian pepper infest approximately 450,000 and 700,000 acres in South Florida, respectively. Melaleuca can grow into dense strands containing upwards of 20,000 stems per acre and Brazilian pepper is a prolific seeder that also can develop into a monoculture if left untreated. Control methods are primarily ground crew direct tree herbicide applications or if dense strands, aerial herbicide applications.

[1] List is from the Florida Exotic Pest Plant Council.

Aquatic weeds such as hydrilla also develop dense mats at the water's surface quickly. It can grow up to three inches in a day and can reduce canal conveyance and virtually render waterways impassable. Control methods are mechanical harvesting, grass carp stocking and herbicide application.

Surface mat of hydrilla on Lake Okeechobee

The objective of the program is to ensure canal conveyance capacity, protect the quality of resources and enhance fish and wildlife habitat. This program integrates mechanical, biological, herbicidal and physical methods (such as fire and flooding) to control exotic vegetation.

The vegetation management program aims at attaining maintenance control over exotics in canals, lakes, right-of-ways and District properties. Maintenance control is defined as a means of applying management techniques on a continuous basis to keep invasive plant populations at its lowest feasible level. In District canals, this means maintaining floating aquatic plants at less than 1% of the entire canal surface area and 50% unobstructed for submersed plants. According to a quarterly performance measurement report, the program goals are being met. The application of herbicide products to control exotic vegetation is the most cost-effective approach. Herbicides used by the District are limited to only those approved by the Environmental Protection Agency and the Florida Department of Agriculture and Consumer Services.

The Division has a staff of nine employees that devise program strategies and direct vegetation management activities. Sixty-eight field station employees perform aquatic plant management activities, primarily herbicide application and mechanical harvesting. They also work in other programs on an as needed basis. In addition, outside contractors are used. The FY98 cost of the Vegetation Management program is as follows:

Program Name	FY98 Expenditures
Restoration and Stewardship	$ 2,900,561
Aquatic Plant Control	12,173,992
Melaleuca Control	1,003,518
Other	2,594,434
Total	**$18,672,505**

In FY98, the District spent approximately $3.5 million on outside contractors for control of exotic plants. For the period October 1, 1998 through April 22, 1999, the District has spent $2.1 million. Expenditures were for aerial and ground crew herbicide applications primarily targeting melaleuca trees. To a lesser degree, contractors also treated Brazilian pepper, Australian pine and other exotics. FY98 aquatic plant control expenditures of $12.2 million are primarily for District field station aquatic's personnel and herbicides. Approximately $7.8 million of the aquatic plant and melaleuca control expenditures were reimbursed to the District by DEP.

The Division coordinates with the Florida Department of Environmental Protection, Florida Game and Fresh Water Fish Commission, the United States Army Corp. of Engineers and local governments to implement vegetation management activities. Significant programs partnered with other governments include aquatic plant control in Lake Okeechobee, the Kissimmee Chain of Lakes, melaleuca eradication and stocking canals with grass carp.

Objectives, Scope and Methodology

The purpose of our audit was to determine that the programs are being managed in an effective and efficient manner and that inventory controls over herbicides are adequate. Audit procedures included the following:

- Review of herbicide inventory controls at select field stations.
- Observe the hydrilla control project in the Kissimmee Chain of Lakes.
- Analyze the melaleuca eradication program and other exotic weed control activities.
- Interview staff who manages or is active in vegetation management programs.
- Assess whether performance measurements for programs were established and whether the desired results are being achieved.

Our audit was conducted in accordance with generally accepted government auditing standards.

Findings and Recommendations

Summary

On an overall basis, the program appears to be operating in an effective and efficient manner. The Division employees' morale is high and their dedication to the program was evident during our field trips. DEP representatives and other officials we encountered were complimentary of District staffs' handling of the program. It is also apparent that the program is a leader in the state of Florida in controlling exotic nuisance plants. Nevertheless, opportunities for improvement exist.

Herbicide usage controls could be improved. Reports summarizing herbicide activities had differences that were unreconciled. We recommend that the hours and usage data be reconciled to payroll and inventory records. Also, Vegetation Management crews are required to enter virtually the same activity data into two database systems. From an efficiency standpoint, the data should be entered once. A survey of the aquatic plant crew supervisors at the eight field stations revealed that maintaining the two systems took a significant amount of time away from field inspections and supervising crews. However, supervisors did not consistently document their inspections when they did get out in the field.

Under two grant agreements with DEP, the District conducts aquatic plant management and melaleuca eradication activities. During FY98, DEP reimbursements relating to these two programs, were $7.8 million. The District receives no advances, which are available, from DEP. An analysis of FY98 program payments indicated that District reimbursement from DEP for aquatic plant control expenditures took an average of 59 days while melaleuca eradication averaged 48 days. We recommend that the District enter into advanced funding agreements for the aquatic plant management and melaleuca eradication grants.

Monitoring melaleuca eradication contractors with headquarters based staff is difficult because of the remoteness of work sites and the difficulty in reaching those sites. Field station personnel could assist in monitoring work sites within its boundaries. In addition, management should consider initiating a change to the DEP contract, which would allow reimbursement for eradication of other exotic species.

Private landowners in Okeechobee (including Martin/St. Lucie), Fort Lauderdale and West Palm Beach discharge floating vegetation into District canals, impacting the canal maintenance program and overall canal health. We recommend that the District initiate use of project culvert skimmers on a test basis and record baseline data. In addition, contingency plans (enforcement strategies) should be developed if consensus cannot be reached with private landowners.

The Aquatic program's performance measurements could be improved by utilizing the existing reporting system to provide aquatic plant management data to the Operations Division in order to support the achievement of program goals.

Herbicide Inventory Practices Need Improvement

Vegetation management crews update two database systems, a stand-alone Oracle database and a Computer Maintenance Management System (CMMS)[2] for daily herbicide activities. Reports summarizing these activities differed substantially. From an efficiency and accuracy standpoint, the data should be entered once and reconciled to the payroll and inventory records. Also, aquatic plant supervisors found that maintaining the two systems took a significant amount of time away from field inspections and supervising crews. However, supervisors did not consistently document their inspections when they did get out in the field.

Vendor Selection Practices

The Procurement Division goes out for bid every six months for herbicide prices. A District committee evaluates the commodity bids to determine the winners. In the latest bid dated 11/9/98, three vendors were awarded the purchase order to provide the Operations and Maintenance Department with herbicides. The bid tabulation indicated that the low bid to provide ten herbicides was tied. In accordance with the procurement rule, 40E-7.206(2)(b), Florida Administrative Code, which establishes a hierarchy for breaking tie bids, the evaluation committee flipped a coin to determine the winning bid.

To obviate the need to go to a coin flip, Procurement should work with departments to consider incorporating service criteria, such as delivery time, in the bid specifications. Predictable and quick delivery time should enable Operations and Maintenance to better manage inventory levels and help reduce inventory on hand. While this will not eliminate a random selection if more than one bidder submits the low bid, it addresses all necessary qualitative factors up front, thus hopefully reducing the need for such random selections.

Adequacy of Inventory Safekeeping

Herbicide buildings at the District's eight field stations are secured with an alarm and keypad to restrict entry. At most field stations, the Storekeeper, the Aquatic Plant Supervisor and the Field Station Superintendent have the access code and key. Assistant Superintendents and Assistant

[2] The CMMS is a database system developed to help manage operations and maintenance activities.

Storekeepers are also issued access codes and keys at some locations. At one field station with an offsite herbicide storage location, the Aquatic Plant Supervisor does not have access to the main herbicide building because access to both facilities could create a control weakness. Access to the herbicide buildings appears adequately restricted to safeguard herbicide inventory.

Physical counts of herbicides are performed twice annually. At the six-month interval, storekeepers perform physical counts but at year-end herbicides are counted by field station personnel independent of the stores and aquatic weed operations. A review of inventory records indicated that there has been no major physical count to book adjustments.

Strengthen Controls over Issuing Herbicides

At field stations, the Aquatic Plant Supervisor, the Storekeeper or Assistant, dispenses herbicides in the morning. A voucher is completed for the amount of herbicides issued which is used to update inventory records. The storekeeper is responsible for updating the LGFS inventory subsystem. CMMS workorders are updated for herbicide quantities used through an interface with the LGFS inventory subsystem. Storekeepers enter herbicide usage in LGFS which later updates CMMS workorders for these quantities. A comparison of the two systems indicated that LGFS did not always update the CMMS workorders. Performing a periodic reconciliation of the systems could eliminate system differences.

At times, aquatic plant crews do not use all the herbicides issued to them. Based on a survey of aquatic plant supervisors at the eight field stations, the remaining herbicides are sometimes returned to the herbicide building for use the next day or secured in a boat or truck. According to inventory procedures, the unused herbicides should be returned to the storeroom and re-entered in the inventory system. Rarely is the system adjusted for returned herbicides. This is not a significant control issue.

Need for Standardized Inventory Replenishment

Herbicide usage in FY98 was $6.6 million of which $5.1 million was spent on the herbicide sonar. FY97 usage was comparable with FY98.

Our separate analysis of sonar usage revealed that the Vegetation Management Division does a good job of timing the purchase and use of sonar. We also performed a four-year analysis of non-sonar inventory usage. Inventory usage over the period FY95 through FY98 is as follows:

Fiscal Year	Herbicide Usage Excluding Sonar	Inventory Turnover*	Average Days in Inventory**
FY98	$1,430,686	4.33	83
FY97	1,410,612	6.02	60
FY96	1,465,752	5.73	63
FY95	1,356,288	4.66	77

* The inventory turnover ratio tells how often inventory turns over during the course of the year. A high inventory turnover ratio is generally positive.

** The average days in inventory are simply the number of days in inventory based on usage.

Aquatic Plant Supervisors determine the herbicide quantities needed. A survey of these supervisors indicated that there is no formal method for reordering herbicides and it is generally based on judgement (ie. observation and anticipated workload). However, some supervisors established reorder points when certain staple herbicides reach minimum levels. Although weather conditions such as wind and rain and weed transferring may affect the spraying crews work plan, the average number of days in non-sonar inventory appears consistently high; especially after considering that historically, vendors deliver herbicides within one or two weeks after they are ordered.

The purchase agreements do not offer a price break for the amount of quantities purchased. As a result, maintaining high levels of inventory offers no benefit; in fact, it increases the District's risk from loss or accidents.

Except for high inventory quantities, controls over the purchase of inventory are adequate. A requisition originating from a field station requires Superintendent or designee approval and resource approval by the Vegetation Management Division before the Purchasing Division places the order.

Duplicative Recordkeeping with Unreconciled Differences

Field station aquatic vegetation management crews are required to enter daily time and herbicides used into two different reporting systems. The Vegetation Management Division maintains an oracle database primarily to capture employee time, equipment and herbicide usage for an annual report required by DEP, which summarizes vegetation management activities. On an annual basis, the District is required to renew a permit to

treat canals and other water bodies. Maintenance of the Oracle database facilitates recordkeeping in support of the permit.

Herbicide activities are also captured in CMMS. However, the current version of CMMS does not have a reporting module that would produce an annual summary of vegetation management activities. CMMS was not designed to serve this purpose. (Our Office is in the process of performing an audit of the CMMS)

We compared field station inventory usage as reported in the stand alone-oracle database to the inventory usage reported in LGFS for FY98. The comparison produced a total difference of approximately 10%. The high and low difference was 37% and 10%, respectively. We also compared usage reported in the two systems for the more current period October 1, 1998 through February 28, 1999. The variance worsened due to data entry errors. The results of this analysis by field station is as follows:

Field Station	Usage LGFS Inventory Report	Inventory Usage Oracle Database	Variance Amount	Variance Percent
Okeechobee	3,776	78,425	(74,649)*	(1977%)
Kissimmee	213,895	182,385	31,510**	15%
Clewiston	611	18	593	97%
Homestead	1,342	917	425	32%
West Palm Beach	1,676	1,462	214	13%
Miami	1,998	1,808	190	10%
Ft. Lauderdale	857	839	18	2%
Total	224,155	265,854	(41,699)	(19%)

* Variance was primarily due to a data entry error in which the total daily quantity used on October 8, 1998 was 7.6 gallons of herbicide but inadvertently entered as 75,859.

** Variance was due to a timing difference. Herbicide usage was recorded in the LGFS but not entered in the Oracle database until the following period. In addition, herbicide was provided to outside contractors that was recorded in LGFS but not in Oracle.

Although both systems are updated using the same data, there are significant discrepancies. In order to have reliable information the systems must be reconciled and differences identified and corrected.

A survey of the aquatic plant crew supervisors at the eight field stations revealed that maintaining the two systems took a significant amount of

time away from field inspections and supervising crews. Supervisors did not consistently document inspections when they did get out in the field.

Until these duplicative systems are streamlined, they must be reconciled to provide some assurance that reports made to DEP are accurate, current and complete.

Recommendations

1. **Build in all necessary qualifications, i.e. delivery time, packaging, etc. into the responsiveness/responsibility criteria of the bid specifications.**

   Management Response: Management concurs with the recommendation.

   Responsible Division: Procurement
   Estimated Completion Date: December 30, 1999

2. **Establish an inventory reordering system and reduce inventory levels.**

   Management Response: OMD concurs. The aquatic plant management supervisors and division managers agree to keep inventories at 45 days or less. In unusual circumstances, due to weather conditions, etc., when items are projected to remain in inventory for longer than 45 days, the chemicals will be considered for transfer to another field station. All users have been informed regarding our practice of "just in time" ordering. We are committed to continuing improvements in this area to the fullest extent feasible.

   Responsible Department: Operations and Maintenance
   Estimated Completion Date: September 30, 1999

3. **Periodically reconcile inventory activity in the CMMS and LGFS.**

   Management Response: OMD concurs. An automated process for comparing the LGFS and CMMS inventory transactions is being developed to ensure reconciliation between the two systems on a nightly basis.

   Responsible Department: Operations and Maintenance
   Estimated Completion Date: December 30, 1999

4. **Streamline recordkeeping systems so that hours and herbicide usage are entered once. Data should be reconciled.**

   Management Response: OMD agrees. Based on this recommendation, we will attempt to obtain funding approval for system enhancements to the CMMS. In the interim, prior to enhancing CMMS, the following actions will be taken for more timely and accurate reconciliation of the data:

   - Field Station supervisors will insure that all activities are recorded accurately and timely on the spray crew reports and in the Oracle database.

   - Vegetation Management Division personnel will also check accuracy and reasonableness of Oracle reports on a quarterly basis.

   - Since the Oracle database only tracks Funds 202/206 regulatory data, the LGFS herbicide usage should only include herbicides purchased from Funds 202 or 206 for a valid comparison to the Oracle herbicide usage report.

   Responsible Department: Operations and Maintenance
   Estimated Completion Date: December 31, 1999

5. **Aquatic weed supervisors should document field inspections.**

   Management Response: OMD agrees to consistently document field inspections. The department is in the process of consolidating inspection reports into one aquatic field inspection report. OMD's goal is to input the field inspection report information into CMMS.

   Responsible Department: Operations and Maintenance
   Estimated Completion Date: September 30, 1999

Request Advance Funding for Aquatic Plant Management and Melaleuca Eradication Grants

Under two grant agreements with DEP, the District conducts aquatic plant management and melaleuca eradication activities. District expenditures for salaries, equipment, herbicides and contractor costs incurred performing grant-related activities are reimbursed by DEP. However, the $1 million melaleuca eradication grant requires a District match of 50%. The other agreement has no such requirement. During FY98, DEP reimbursements for these two programs, were $7.8 million.

A provision in the aquatic plant management grant agreement offers the District an opportunity to request quarterly advances from DEP. A Grant Coordinator from DEP's Bureau of Aquatic Plant Management explained that grant funds could be disbursed on an advance or a reimbursement basis. Thus far, the District has opted to request funding on a reimbursement basis.

Requesting advance reimbursement of grant funds could have significant benefits to the District, particularly for cash flow. In contrast to a reimbursement basis, which ties up the District's own funds that could be used for other purposes, grant funds on an advance basis are received before expenditures are incurred. An analysis of FY98 program payments indicated that District reimbursement from DEP for aquatic plant control expenditures took an average of 59 days while melaleuca eradication averaged 48 days.

The cost to the District for funding DEP's cost sharing contribution approximates $53,000 annually. If the District opted for advance payments additional administrative work would be required to track interest on the unused advance.

Although the current melaleuca eradication grant agreement does not have an advance provision, DEP's Grant Coordinator indicated that it could be added to the next agreement. Final approval to advance grant funds is required by the state's Department of Banking and Finance.

Recommendation

6. Include an advanced funding provision for the aquatic plant management and melaleuca eradication grants.

Management Response: The District's Accounting Division does not fully concur. While the possibility of improved cash flow from advances exists, it may not produce any significant benefits for the District. Additional internal processing time will be incurred to account for these advances which may limit the benefits.

However, one possible solution that would maximize the benefit accruing to the District is to request one advance per year for the quarter that has planned Sonar treatments. Generally, each year, Sonar treatments comprise about 80% of the Aquatic Plant program costs. That large outlay, if executed according to plan, could be advanced once each year. Approval from DEP and the Department of Banking and Finance would need to be obtained. The OMD Vegetation Management staff will coordinate a meeting with the DEP Grants Coordinator and Accounting staff to explore this alternative.

Responsible Division: Accounting
Estimated Completion Date: April 30, 2000

Monitor Contractors with Employees Closer to Contractor Work Sites and Expand DEP Contract's Scope of Work

Currently, plant control contractors are almost exclusively monitored by the Vegetation Management Division's headquarter based staff. Monitoring exotic plant control contractors is difficult because of the remoteness of work sites and the difficulty in reaching those sites. Field station personnel could assist in monitoring work sites within its boundaries. In addition, management should consider initiating a change to the cost-sharing contract with DEP, which would allow reimbursement for eradication of other exotic species.

For the period October 1, 1998 through April 22, 1999, the District expended $2.1 million with twenty-seven outside contractors to assist with exotic plant control. Expenditures were for aerial and ground crew herbicide applications primarily targeting melaleuca trees. To a lesser degree, contractors also treated Brazilian pepper, Australian pine and other exotics.

Project management of these contracts is labor intensive because of two factors, 1) project managers are located at District headquarters but the work sites are usually remote, and 2) difficulty in reaching some of the work sites.

Infestations of exotic plants occur in very remote areas of the District. Contractor work locations can often only be reached by airboat or swamp buggy. To determine whether the contractors are adequately supervised and monitored, we reviewed three exotic plant eradication contracts valued at $954,805, which were managed by staff in the Vegetation Management Division.

These are time and material contracts. In other words, the contractor is paid by the hour for herbicide spraying activities and all materials used. As a result, strict monitoring is critical. The District pays the contractor weekly to take advantage of early payment discounts. A review of the monitoring reports indicates that the project manager did not always review the work before District payment. However, as a compensating control, a stipulation in the contract allows the District to request the contractor to re-spray an area at the contractor's expense if the District finds the initial work unsatisfactory. According to the Project Manager, this provision was used once when the contractor's work was considered substandard.

Two of the contracts reviewed were for melaleuca eradication. Based on the monitoring reports prepared, one contract was particularly problematic. Contractor crews were progressing slowly and there was a lack of crew supervision. The project manager found it necessary to visit the work site almost twice weekly since the contract inception. As a result of staying on top of the contractor and communicating the District's dissatisfaction with the progress of the work, the contractor is improving their performance and the work is progressing at a better pace. Vegetation Management staff monitored the other melaleuca contractor on average once every two weeks. The monitoring reports indicated that the work was progressing nicely.

The third contract reviewed was also for exotic plant eradication. No written monitoring reports were completed but the project manager stated that site visits of the work area were performed. Based on conversations with the project manager, the work orders originated from District field stations. Due to the remoteness of some contractor work areas, it would be helpful if field station personnel requesting the work also monitor the contractor, prepare a written report and forward the report to the project manager. Some training may be necessary.

The primary focus of DEP and the District has been melaleuca eradication. A cost-sharing contract with DEP reimburses the District approximately $1 million for melaleuca eradication work. Based on a study of managing melaleuca, the control program initiated approximately seven years ago has indicated that the infestation has decreased considerably in many areas of the District and is under maintenance control in these areas.

Although it remains and will remain a continuing problem, management should consider an approach that targets all exotics in an area rather than just melaleuca. Studies also show that Brazilian pepper is as invasive and noxious. Often times, contractors encounter Brazilian pepper and other exotic species during the course of their melaleuca eradication work in remote locations. However, the cost-sharing contract only allows for reimbursement relating to melaleuca eradication. An amendment to the contract, allowing reimbursement for eradication of Brazilian pepper and other exotic species, could provide Vegetation Management with more flexibility and benefit the overall program.

Recommendations

7. Assign monitoring responsibility to field station personnel closer to the work and have them prepare monitoring reports. Initiate training as necessary.

Management Response: OMD concurs with cross training to implement this recommendation to the extent feasible. Reductions in aquatic plant management staff have already limited manpower for critical functions and have reduced availability of field staff to handle contract management functions. The exceptions are the Fort Lauderdale and Miami Field Stations. Going forward, the Vegetation Management Division has developed a field station training schedule to provide necessary assistance to monitor Vegetation Management Division contractual work.

Responsible Department: Operations and Maintenance
Estimated Completion Date: July 31, 1999

8. Consider initiating a change to the contract with DEP, which would allow reimbursement for eradication of other exotic species.

Management Response: OMD recommends that rather than change the existing contract and risk an appropriation reduction for melaleuca eradication, we will request additional funding under a new DEP grant for eradication of other exotic nuisance plants.

Responsible Department: Operations and Maintenance
Estimated Completion Date: April 30, 2000

Control Aquatic Weed Discharges

Floating vegetation being transferred from private land to District canal

Private landowners in Okeechobee (including Martin/St. Lucie), Fort Lauderdale and West Palm Beach discharge floating vegetation into District canals impacting the canal maintenance program and overall canal health.

According to a Vegetation Management analysis of spraying activity in FY98, spraying crews would have treated approximately 90 acres of aquatic weeds under normal maintenance conditions in the C-23, C-24 and C-25 canals. However, spray crews treated a total of 1,150 acres of aquatic weeds in these canals largely due to the volume of weeds discharged by private landowners. The analysis also identifies 35 other canals in the District with similar problems but not as severe as the C-23, C-24 and C-25 canals. Projecting the cost of this practice on a District wide basis indicates that treating discharged floating vegetation was an additional $350,000 in FY98 ad valorem expenditures. Besides the additional cost, weed control activities may impact the overall water quality of District primary canals, which may reduce dissolved oxygen levels and may lead to fish kills. Canal conveyance is also reduced from the build-up of sediment on canal bottoms.

In the Indian River Lagoon, District vegetation management activities have been blamed for contributing to the fish lesions and other problems. The District has contemplated various solutions since 1993. However, a course of action has not been finalized. In the interim, the District uses a combination of mechanical harvesting[3] and herbicide spraying to treat

[3] It is important to note that mechanical harvesting of aquatic weeds is expensive and slow. Thus, it is cost prohibitive for all canal maintenance. The Vegetation Management Division calculated that the cost to mechanically harvest one acre of aquatic weeds is $500 versus $65 to spray herbicide. However, it is the only method of control in some areas of the District, particularly in Miami Dade County, where canal water is used to irrigate many homeowner lawns. Also, currents in lower east coast canals render herbicides ineffective.

aquatic weeds to minimize these adverse effects in the Indian River Lagoon area. In addition, the District monitors dissolved oxygen levels in the C-23, C-24 and C-25 canals.

Pursuant to Chapter 373.085 Florida Statutes, where private persons wish to connect with, or otherwise make use of, "works of the district" the connection is authorized by a permit. This permit, authorizing the construction of the connecting facility (normally a culvert) within the District's works, is commonly referred to as a "Right of Way Occupancy Permit". Conditions attached to these permits contain a prohibition on the discharge of debris or aquatic weeds. The actual discharge of surface water through such a private culvert falls under the purview of a Surface Water Management Permit which, at this time, contain no specific language prohibiting the discharge of debris or aquatic weeds.

It is difficult to identify which landowners are discharging aquatic weeds. Without the benefit of videotape or other evidence establishing the discharge site, a successful enforcement action is doubtful. Historically, the District has been passive in dealing with private landowners that transfer aquatic weeds into the canal system. To date, the District has not initiated an enforcement action against landowners for discharging aquatic weeds.

Recently, the District established a working group of key District department staff and private landowners to cooperatively develop a workable solution. A skimmer was discussed that attaches to an existing District project culvert which was designed to capture aquatic weeds but allow water to flow through. However, there is no baseline data that proves or disproves its effectiveness. Without such data, the District is exposed to an inverse condemnation lawsuit if the skimmers were implemented but did not work properly and flooded private land.

Recommendations

9. Initiate the use of a project culvert skimmer on a test site and record baseline data.

Management Response: OMD concurs and has been developing the project culvert baffle program since 1998.

Implementation of the “skimmer project” has been underway for some time. Project culvert skimmers (baffles) are currently being procured through contracts C-9013 and C-9015 for PC03 and PC05 on the L-65 respectively. There was a concern raised regarding the amount of

headlosses one could expect using these types of weed barriers. There is no known precedent for modeling the hydraulics at these baffles. The project culverts were selected because their locations are considered low risk due to the fact they drain a swamp adjacent to the L-65. Upon completion, headlosses will be measured under known conditions to establish modeling criteria. All new capital and non-capital project culverts have, as a minimum, an assessment regarding the potential to introduce weed barriers at the specific locations. Issues being considered include, but are not limited to, right-of-way access for weed maintenance, hydraulic head losses, and suitability of various types of barriers.

Responsible Departments: Operations and Maintenance and Construction and Land Management

Estimated Completion Date: September 30, 2000

10. Develop a timeline for completing a workable solution with landowners. If one can't be reached within the time specified, develop an enforcement plan and other plans (ie physical barriers in canals) as deemed necessary.

Management Response: There has been an ongoing, multi-departmental effort to address this issue. In the spring of 1998, the agency narrowed the scope of its investigation to the C-23, C-24, and C-25 canals. A thorough definition of the problem and potential solutions has been developed through the efforts of staff from the OMD Engineering Unit, Vegetation Management Division, and the Okeechobee Field Station, Right-of-Way and Construction Divisions in CLM, Regulation Department, the Office of Counsel, Executive Office, and the Martin St. Lucie Service Center, and Planning Department. In addition, staff from the Martin St. Lucie Service Center and OMD have completed a package for property owners that details the problem and recommended solutions. The issue is extremely complicated and carries with it many policy issues that would have to be fully addressed. For example, the Regulation Department has concluded that full implementation requires more staff than are currently available. These unresolved issues need to be clearly addressed and resolved at an agency level.

Responsible Departments: Operations & Maintenance, Regulation, Construction and Land Management, Martin/St. Lucie Service Center, Executive Office, Office of Counsel.

Estimated Completion Date: There is a District-wide multi-disciplinary team that is currently developing a plan and schedule for this issue.

Strengthen Performance Measurements

The Aquatic program's performance measurements could be improved. The Division's performance goals are to maintain District canals at 99% unobstructed while maintaining structures 100% clear of aquatic plants. The Division also strives to maintain 50% unobstructed for submersed plants. Other measurements such as stocking canals with grass carp and biological exotic controls are also reported quarterly. According to the last two quarterly performance measurement reports, the program goals are being met.

Although these goals are clear, the underlying data provided by field station aquatic crews does not support the achievement of goals. Under the present reporting system, field stations report on a quarterly basis the number of acres treated. This may or may not translate into a percentage that the canals are free of aquatic weeds and unobstructed The number of acres treated does not directly affect the percentage that canals are clear. Thus, the measurements currently calculated do not provide Operations Division management with sufficient and timely data to determine the condition of the canals and its ability to move water.

A performance measurement system should provide useful information for decision-making and program management. Input and output measures must be definable, countable and readily measurable. For example, inputs might be defined as herbicides and FTE's and outputs clear structures and canals.

Performance measurement reporting should create a clear linkage of how aquatic programs fit into department goals and then overall District goals. The aquatic control program should have a direct link to canal conveyance and how well the District moves water. Thus, the Division's goal of unobstructed canals should tie into the canal conveyance measurements.

Efficiency and effectiveness measures the results and accomplishments of the program over time. The number of full time equivalents should have a direct relationship with the Division's ability to reach those goals. Under the current system, it is difficult to determine whether the program is staffed correctly to reach those goals. The Division has initiated a review of current performance measurements.

Recommendation

11. The Vegetation Management Division should utilize the existing reporting system to provide aquatic plant management data to the Operations Division in order to support the achievement of program goals. In addition, consultation with the Operations Division could be beneficial.

Management Response: OMD concurs. Staff has been reporting aquatic plant management work into the existing performance reporting system. Staff is currently improving the data reported by linking the field data to canal/waterbody maintenance goals.

Responsible Department: Operations and Maintenance
Estimated Completion Date: December 31, 1999

Illustration of Herbicide Application to Melaleuca Infested Area

Melaleuca on Pensucco property before herbicide treatment.

Results approximately 10 months after herbicide application